Aimee Kennedy, PhD
Senior Vice President
Philanthropy and Education
July 27, 2017

State of STEM

NASA Advisory Council

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Our mission

To translate scientific discovery and technological advances into societal benefits

Battelle

Parent

Principal & teacher

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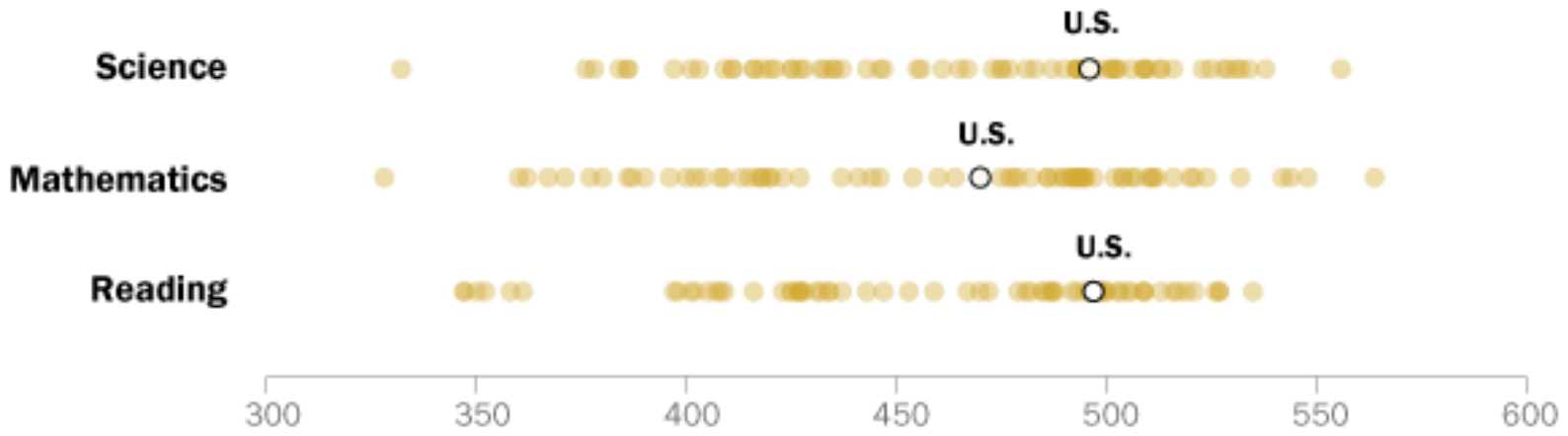
What's the state of STEM in the U.S.?

Mediocre scores

Internationally, U.S. stands in middle of pack on science, math, reading scores

Average scores of 15-year-olds taking the 2015 Program for International Student Assessment



Note: Scale ranges from 0-1,000. Results from China not included because only four provinces participated in PISA 2015.
Source: OECD, PISA 2015

PEW RESEARCH CENTER

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Growing place in economy

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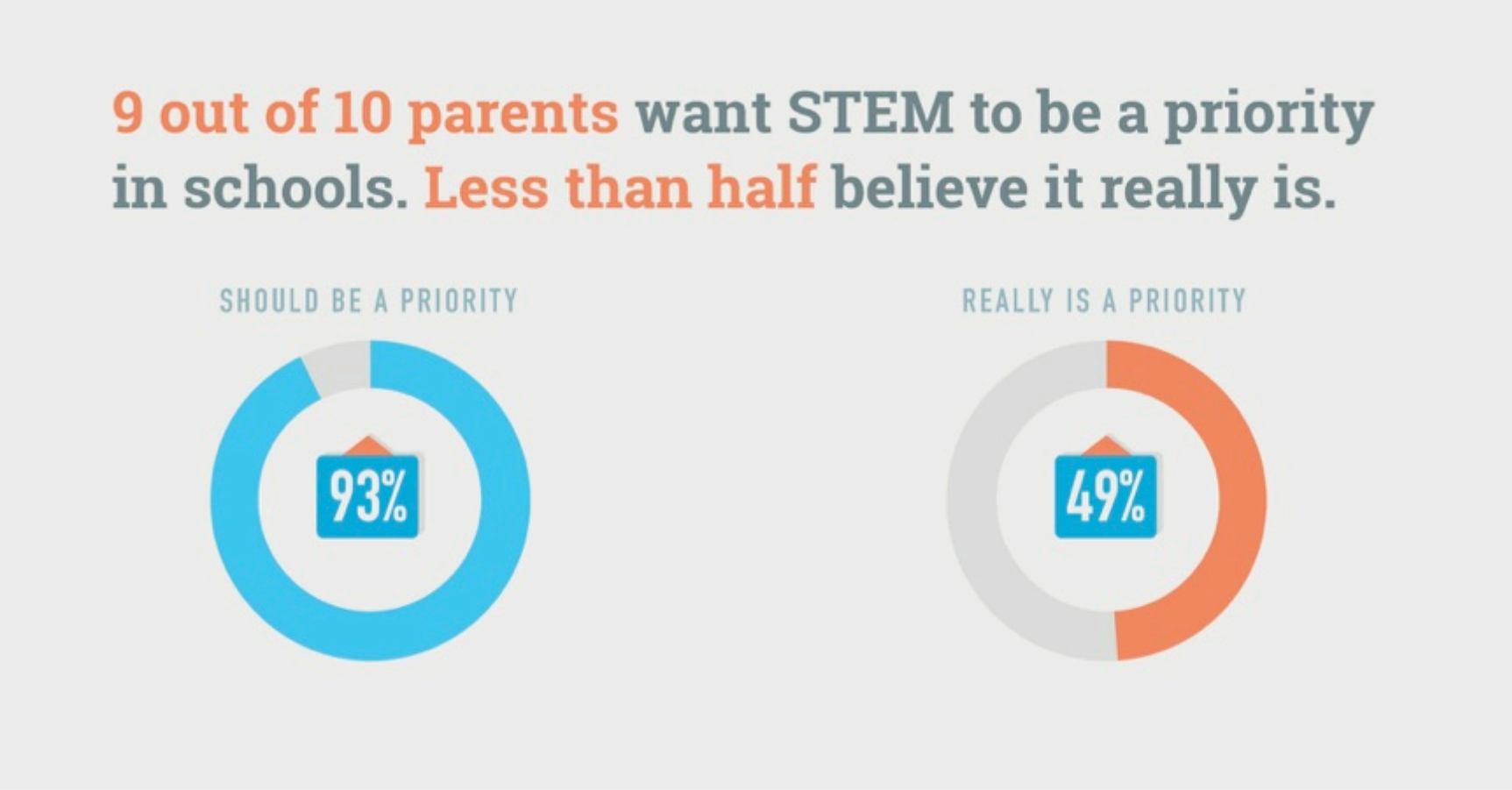
Highly valued



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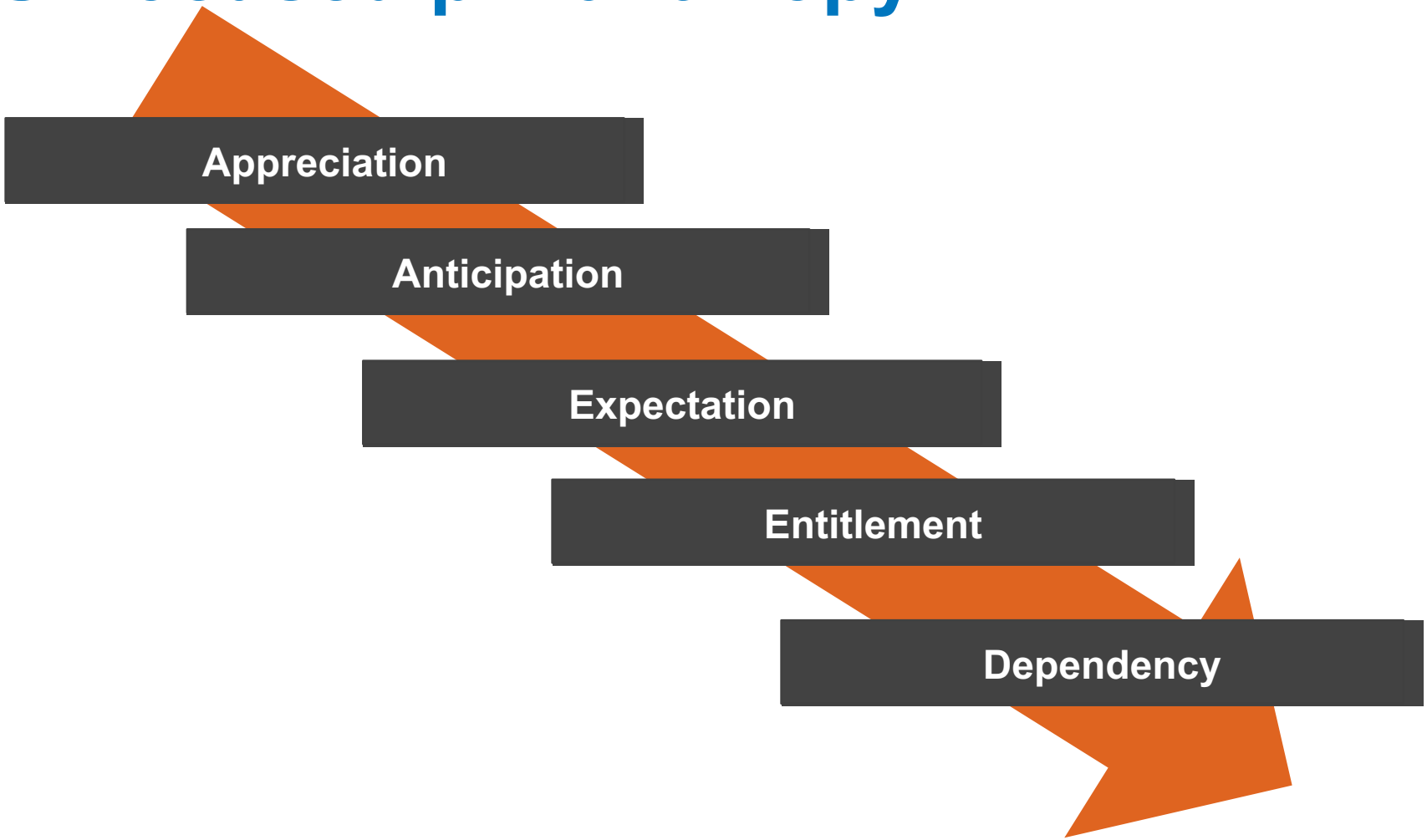
Effective grant-making changes this

Peanut butter = tasty snack, not a philanthropy strategy

Unfocused philanthropy



Toxic Charity by Robert Lupton, 2011

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Strategic Philanthropy

Informed by the Will… Creativity, Research and Discovery

Strategic Partners

- Demonstrate financial integrity
- Approach their work as entrepreneurs
- Have a visionary leader
- Model a profit for purpose mentality
- Located in Central Ohio

Programs

- Focused on education (preferably STEM)
- Accelerate innovative approaches
- Provide access and equity
- Incubate new initiatives that are sustainable
- Clear entry and exit point

STEM focused philanthropy

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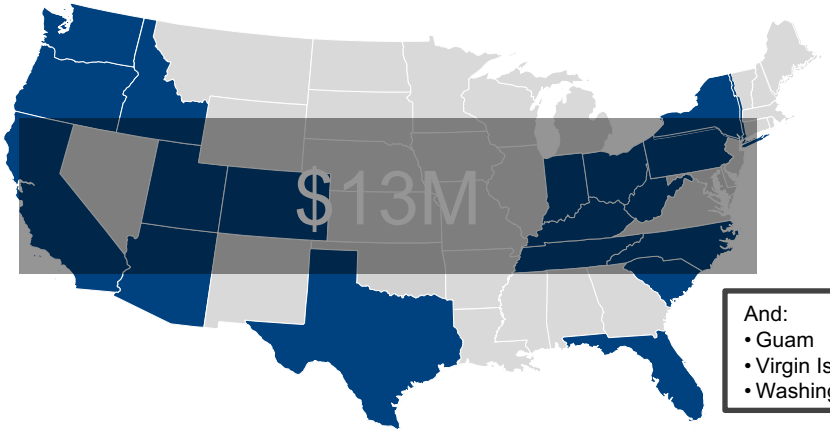
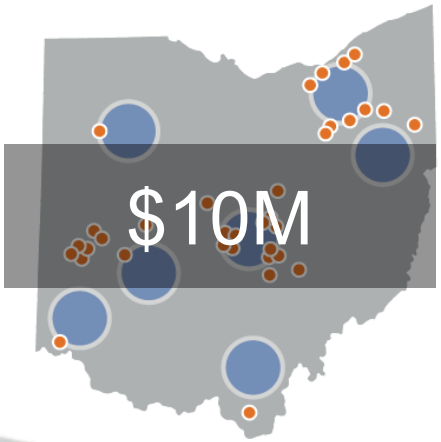
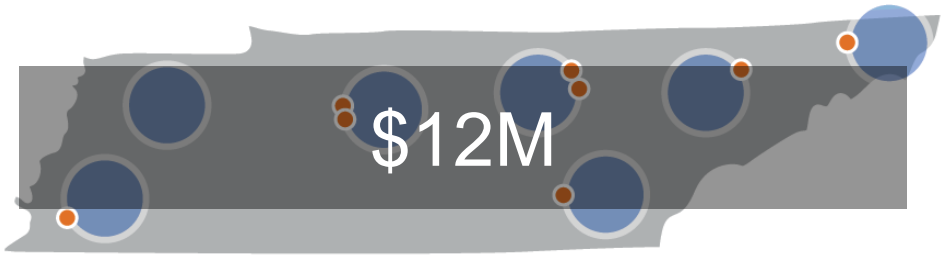
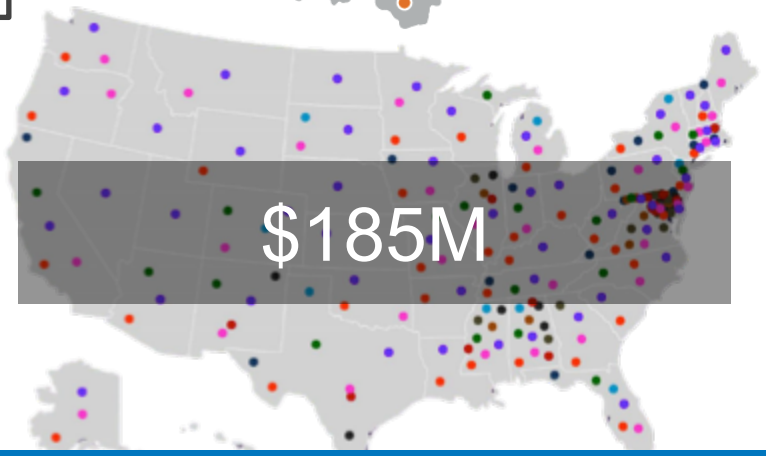
Leveraged STEM Philanthropy



And:
- Guam
- Virgin Islands
- Washington, D.C.







Battelle-managed education work
$220M since 2008

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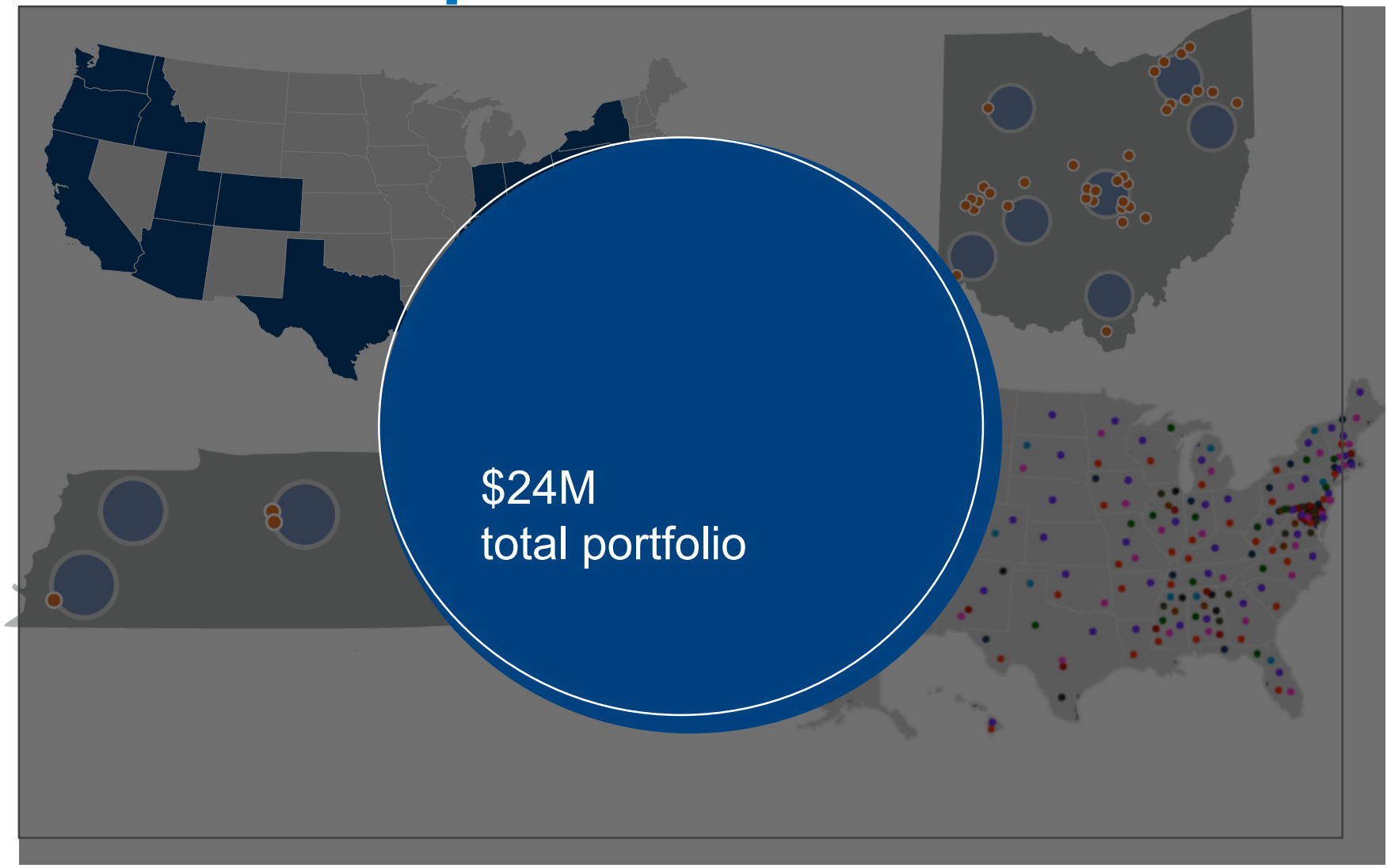
Our annual portfolio



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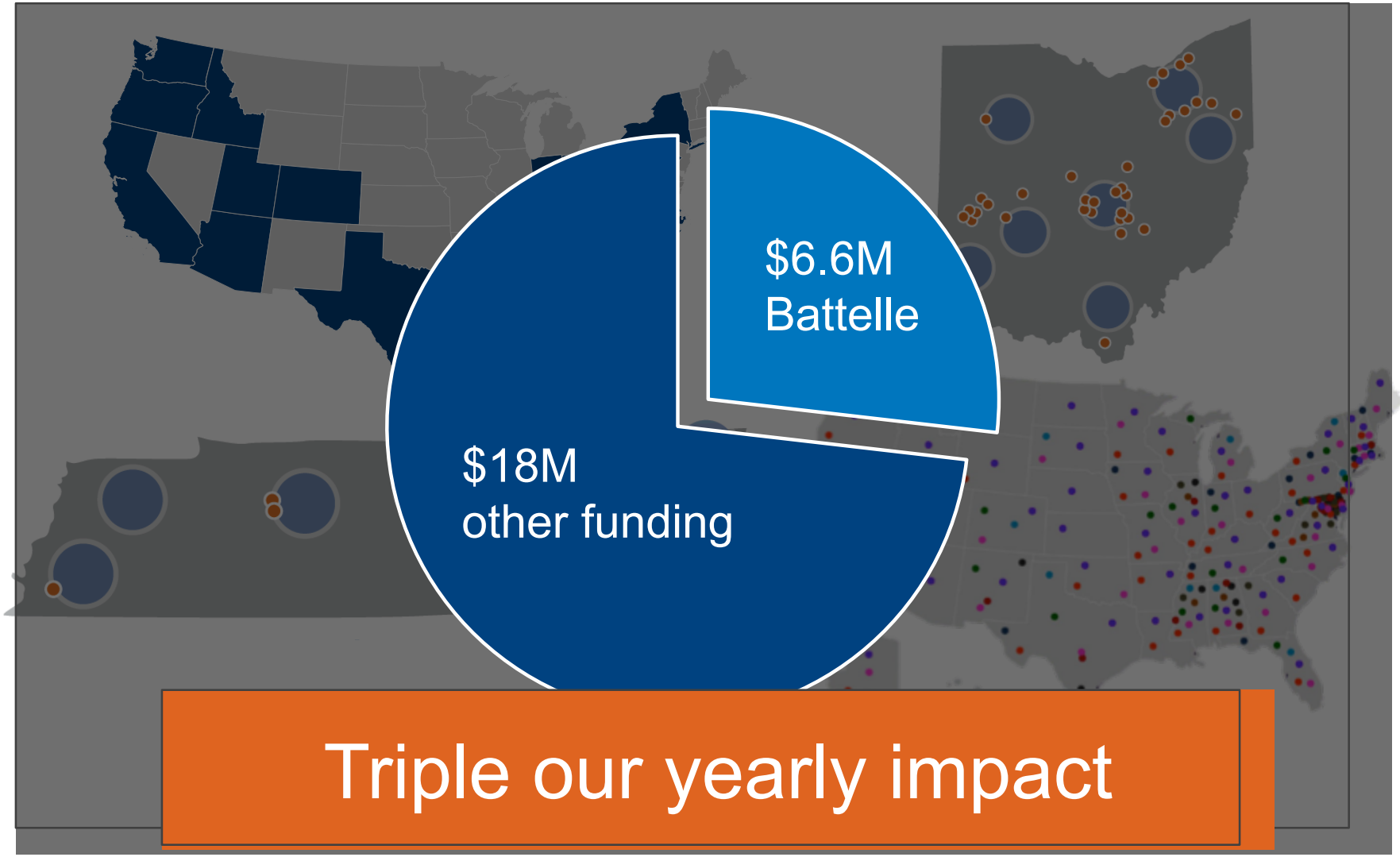
Our annual portfolio



Triple our yearly impact

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Lesson #1:
Know your vision

Science

Technology

Engineering

Mathematics

Strategies

That

Engage

Minds

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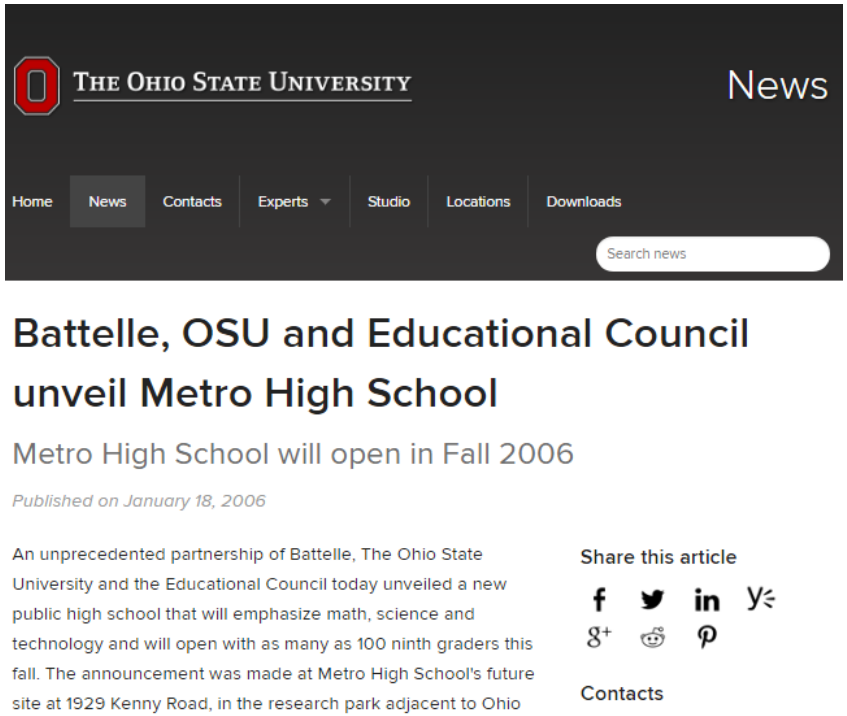
Lesson #2:
Pressure test your idea

Decades of education at Battelle

- Ohio State
- Battelle
- 16 local school districts



2005

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Decades of education at Battelle

1 school

2005

2006

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Metro High School

- Established in 2006 – inclusive lottery admission
- 100% graduation rate
- 100% college admittance rate
- 85% of students earn college credit
- Student ACT scores consistently beat Ohio's average (2016: 24.7 vs 22)

Lesson #3:
Partner to scale

Decades of STEM education

4 schools

2001 2006 2008

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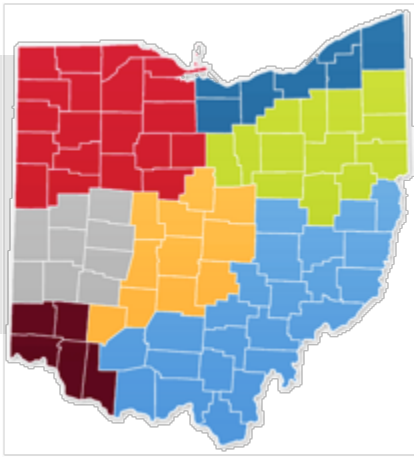
Decades of STEM education

$10 million from the State of Ohio to grow and sustain the network



Regional STEM & 11 schools

2001 2006 2008 2009

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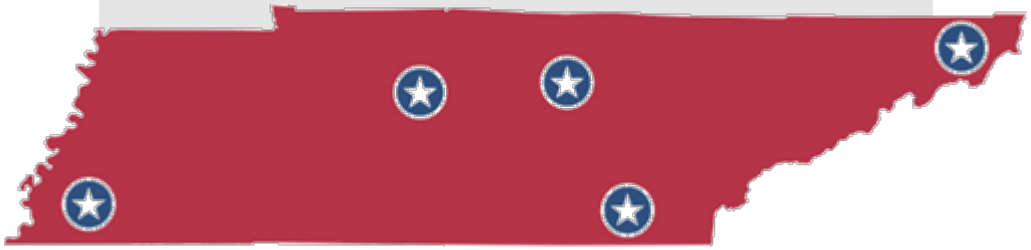
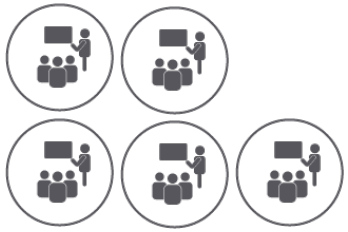
Decades of STEM education

Under a second $13 million federal Race to the Top grant, Battelle starts with Tennessee network with 5 new schools



5 new schools



2001 2006 2008 2009 2010

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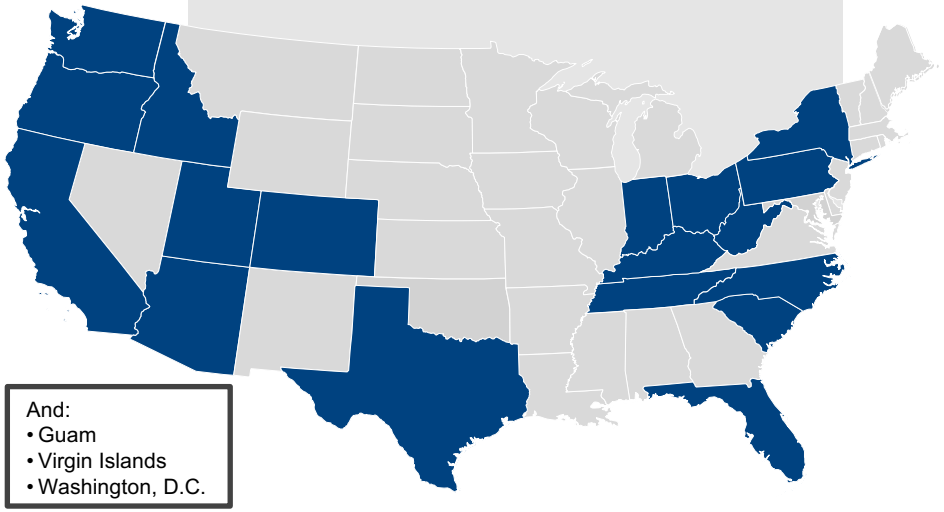
Decades of STEM education

Battelle and other states founded national STEMx network, today counting 21 states/territories as members



And:
- Guam
- Virgin Islands
- Washington, D.C.

2001 2006 2008 2009 2010 2012

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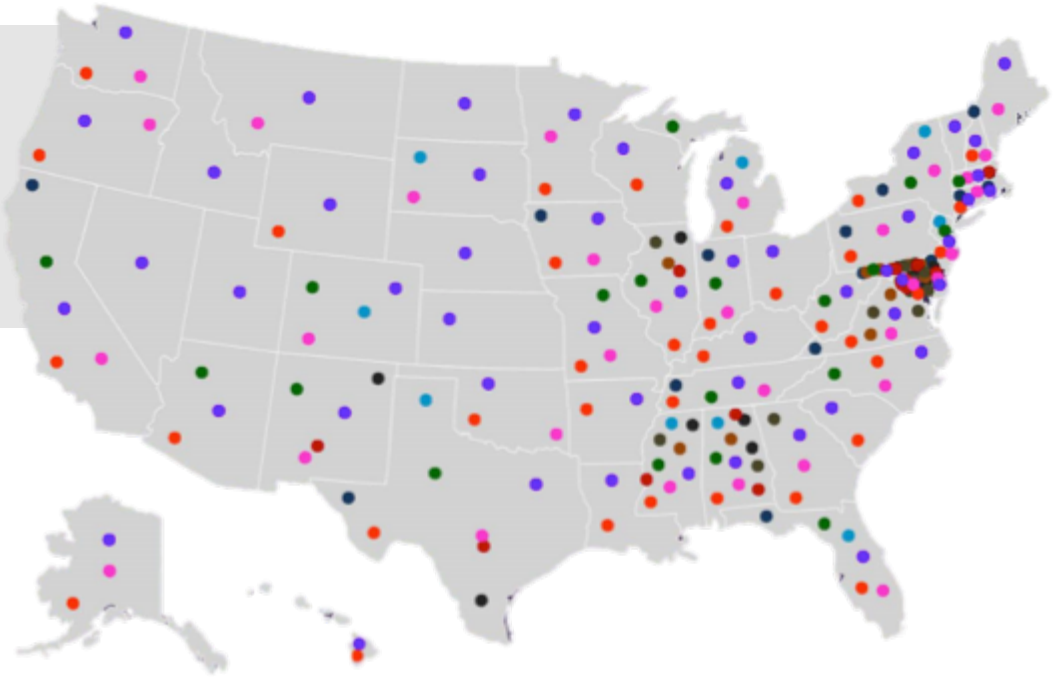
Decades of STEM education

Battelle-led consortium wins $185 million, 10 year award to manage Army Educational Outreach Programs (AEOP)



2001 2006 2008 2009 2010 2012 2015

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Lesson #4:
Tell your story

Quantity matters

Ohio
9,000+ teachers trained

Tennessee
500,000+ students impacted

STEMx
21 states and territories

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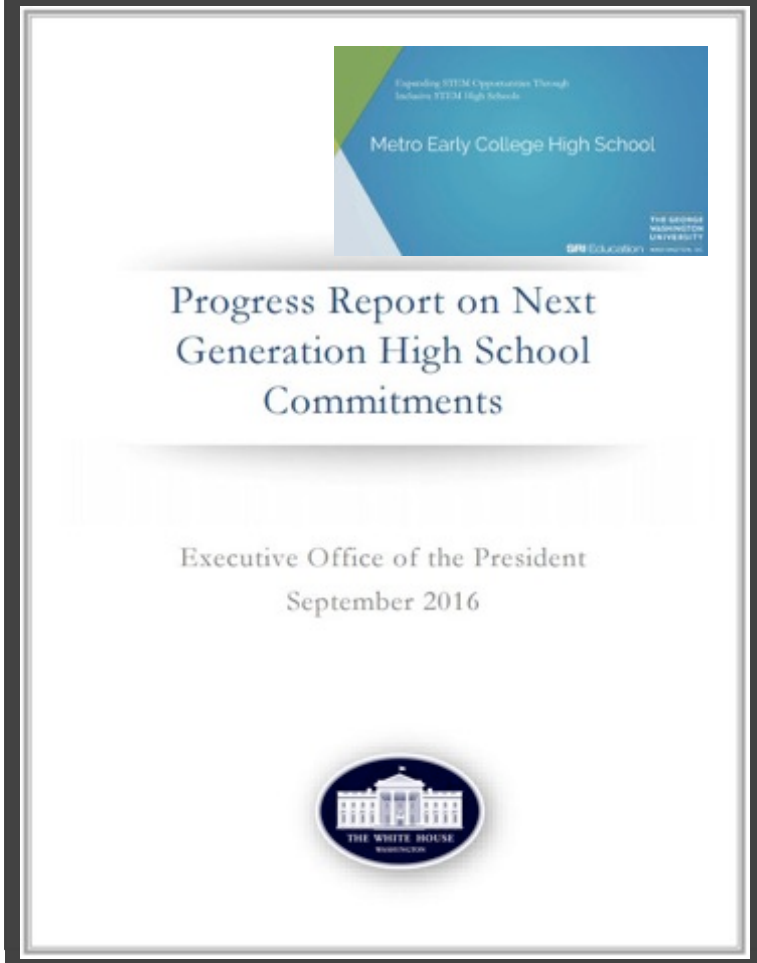
Quality matters

Sept. 2016: White House report



April 2015: Editorial

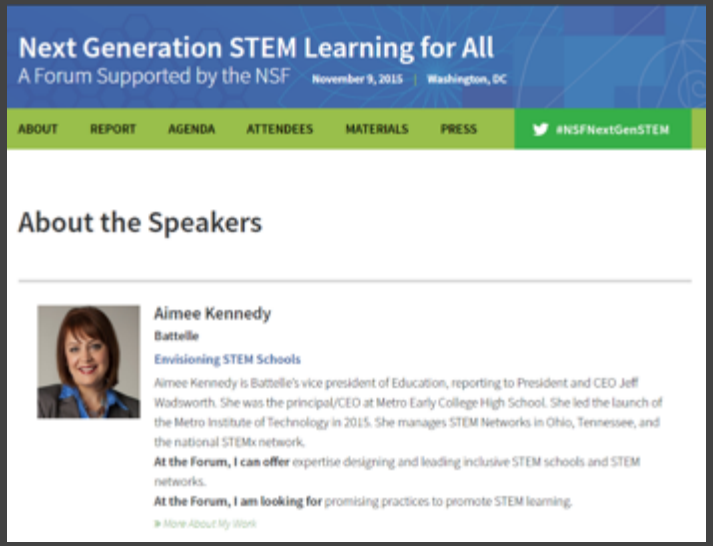
The Columbus Dispatch

New school to give a head start

A decade ago, Battelle joined with Ohio State University and a consortium of Franklin County school districts to form Metro Early College High School, a public school offering the intimacy and sense of mission of a private school to Franklin County students passionate about STEM studies -- science, technology, engineering and math.

Now, as student debt and high college tuition make it more difficult for many bright kids to go to college straight out of high school, Battelle and Metro are joining with Franklin University and Columbus State Community College to create opportunity along a new path.

Nov. 2015: NSF Summit



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Quantity AND Quality

MC² STEM High School
9600 Completed Internship Hours

Reynoldsburg Summit Road Elementary
2016 National Blue Ribbon School

Metro High School
24.7 Average ACT

Global Impact STEM Academy
Featured on NPR's *Morning Edition*

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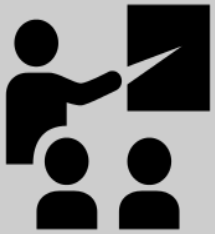
Across divisions

National Lab Outreach 2016

K12 Students	Colleges and University Partnerships	Teachers
		
92,000	2,249 internships Also, lab personnel serve as faculty and program partners	9,500

Each of the labs managed by Battelle
has different STEM outreach programs and strategies.

OAK RIDGE National Laboratory

Student: "The chemistry classes I was able to take during my first year of Middle College really strengthened my love of science…I have a strong passion for research, particularly related to Alzheimer's disease, and I plan to go on to medical school. The UT-BATTELLE scholarship has given me a chance to pursue my dreams, and I really appreciate the investment in me and my future."

Best practice: **Lab-sponsored scholarship allows students from rural Roane County to afford early college classes.**

Idaho National Laboratory

Best practice: **STEM HELP WANTED book details opportunities in STEM and at the lab.**

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Computer Software

Meet Shiloh Elliott, a computer software developer at INL

Education background:
Master's degree in geographic information systems (GIS) from Idaho State University

Bachelor's degree in anthropology from Idaho State University

Job description:
I work for the National & Homeland Security Division at INL. My daily tasks vary depending on which project I'm working on. A very simple way to define my job is that I write programs that allow INL to analyze geospatial data (data that represents actual structures on the planet).

What led you to become a computer software developer?
While I had taken programming classes in high school, it was never on my radar as a potential career path until graduate school. Geographic information science is a data-heavy field. When I was shown how programming could greatly reduce the time it took to process this data while increasing the accuracy, I was hooked. As I took more programming classes, I realized not only did I enjoy the subject, but I was also good at it. The logical steps and critical thinking vital to programming made me want to pursue a career in computer science and informatics.

I have always been interested in maps and am an avid backpacker. This evolved into an acute interest in GPS and spatial relationships. In high school, I took computer programming sequence, which prepared me for my college programming classes. I also took several advanced placement and dual-enrollment college courses, which required critical thinking, problem solving, and time management skills, all of which are vital for computer scientists. As an outdoor enthusiast, I developed an intimate knowledge of how maps work and analyzing spatial relationships, which led me to pursue a graduate degree in geographic information science. It was exciting to find a way to merge my love of the outdoors with my love of computer science.

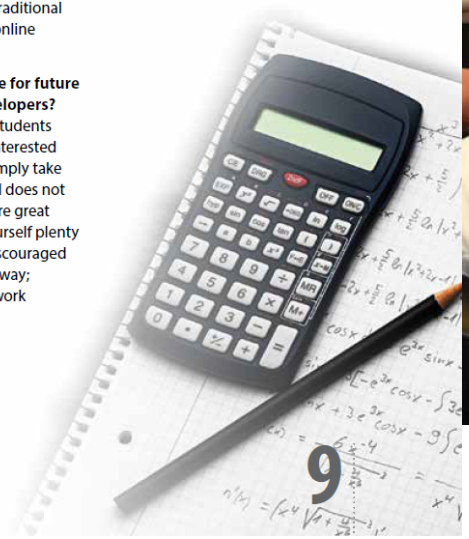
What do you love about your job?
I love the problem solving my job requires. I get to develop applications that have never been done before and apply familiar algorithms in new, innovative ways. I like that my job is not stagnate; I learn new things every day and am able to apply the skills I developed in school in surprising ways. I also really like working with a team, where I can provide vital support to the project and my colleagues while getting the same support from them.

Why is your work important to the mission of INL and the world?
I develop new homeland security applications to help the government better understand our critical infrastructure systems, including electricity and water systems. Understanding where our energy comes from and how it reaches the general population is vital to the United States' energy security. These applications range from traditional maps to new innovative online mapping applications.

What advice do you have for future computer software developers?
I encourage high school students who think that they are interested in computer science to simply take a class. If your high school does not offer such classes, there are great online resources. Give yourself plenty of time and do not get discouraged if you do not get it right away; determination and hard work are the keys to computer programming.

$67,000

AVERAGE STARTING SALARY



The next generation of STEM

Lightweight Innovations for Tomorrow (LIFT)

ALCOA

AAM

BOEING

COMAU

DNV·GL

EATON
Powering Business Worldwide

GKN

LOCKHEED MARTIN

United Technologies Research Center

BATTELLE

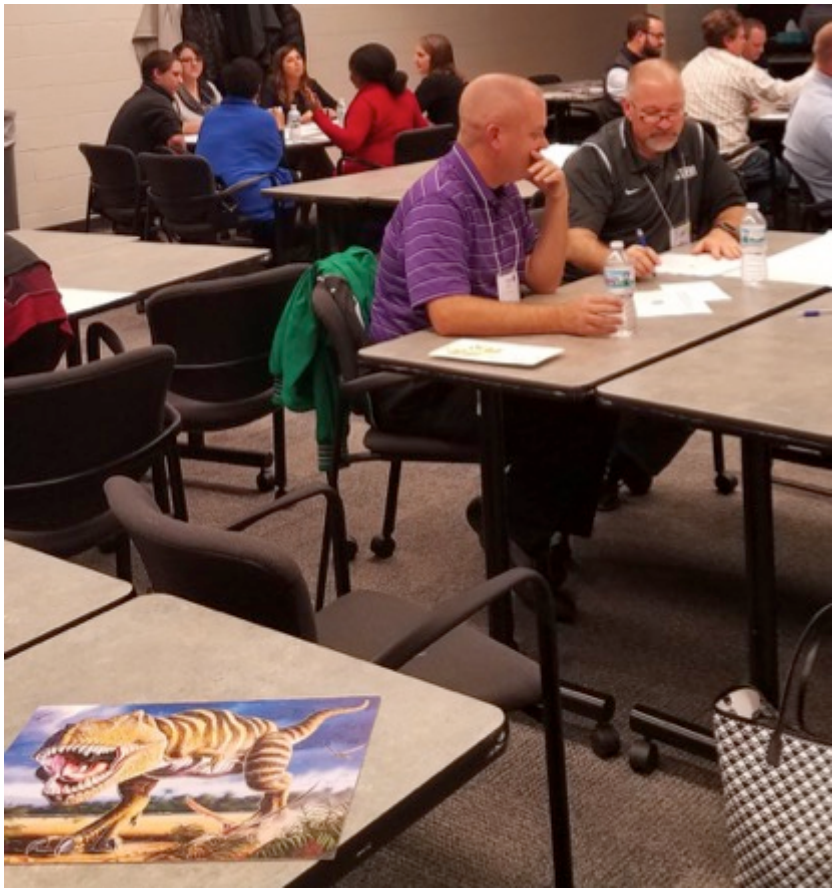
Program to introduce students to manufacturing

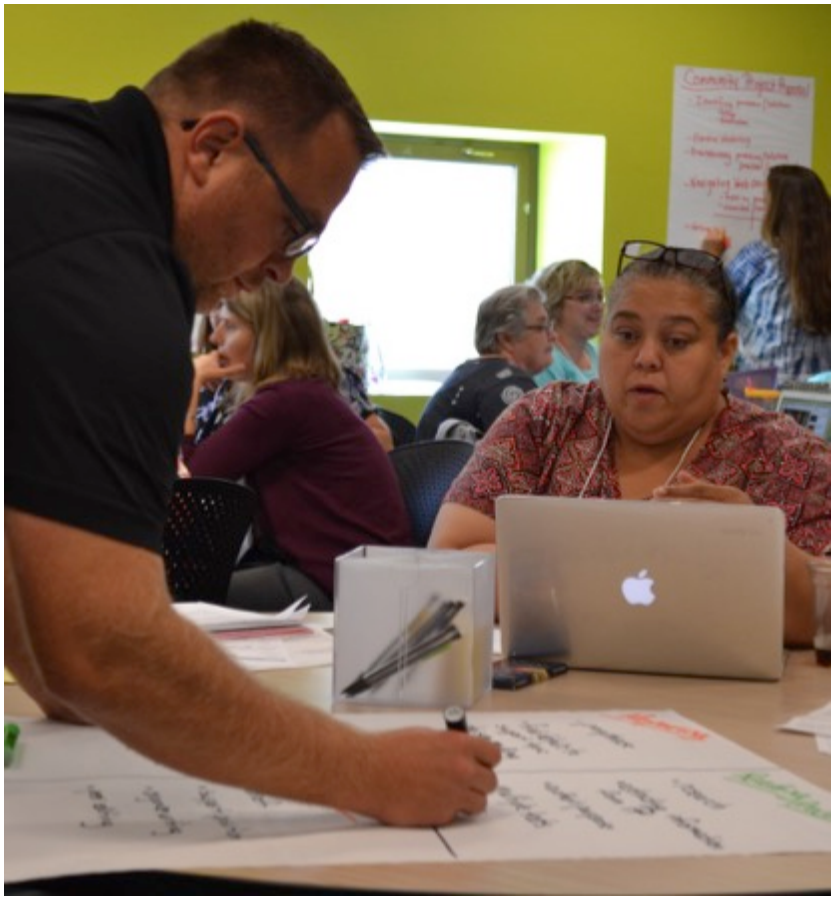
BATTELLE

Partnership with Code.org

Goal:
Build support for Computer Science Education in Central Ohio

Computer science training for teachers





Looking forward

What we're thinking about

- STEM as workforce and economic development
- Unsure on timeline for federal agenda on STEM
- Clarity of message
- Relationships matter:
  - Growing our network
  - Maintaining our relationships

Lesson #4.5:
One story makes all the difference

Ronny Oppong, Metro class of 2010

“I'm discovering and inventing, but I’m also given opportunities to apply new ideas to problems in the real world.”

“If it were my decision, STEM would be part of every school."

Ronny Now

“Looking back, I have Metro to thank for helping me understand the opportunities and my potential to have a footprint in global market.”

“Every day there's a new lesson to be taught and a subject to master, I just show up ready to learn.”

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Findings and Recommendations from STEM Education Ad-Hoc Task Force

Finding 1

Short Title of Finding: Efforts of NASA and the Office of Education

Finding: We acknowledge the efforts of NASA and the Office of Education

- The team has been executing the FY17 plan while simultaneously planning for FY18 while completing the process of the BSA.

- The Task Force recognizes the pressure and complexity facing the team and we applaud them for their commitment and efforts to inspire the next generation of the NASA workforce.

Finding 2

Short Title of Finding: Future STEM Workforce

Finding: NASA has an opportunity to more significantly impact underserved and underrepresented communities through its programs and activities.

- The Office of Education can continue to work with the Office of Diversity and Equal Opportunity to ensure that we meet the needs identified by the Agency's Diversity and Inclusion Plan.

- NASA's commitment to reaching underrepresented and underserved communities has been a long term priority throughout the history of its education activities.

Finding 3

Short Title of Finding: BSA

Finding: Our Task Force has had a chance to look at more of the BSA details, and we concur that the BSA efforts are addressing the issues that have been previously highlighted by the Task Force.

- The Task Force believes that the initial results have the potential to help NASA Education move forward in a more strategic and focused direction.

Recommendation 1

Short Title of Recommendation: Integrated Education Strategy

Recommendation:
Integrated Education and Outreach Strategy for NASA -- Regardless of the budget outcome, NASA would benefit from an integrated education strategy that includes HQ mission directorates, the Office of Education, and NASA centers.

Recommendation 1 Cont'd

Short Title of Recommendation: Integrated Education Strategy

Major Reasons for the Recommendation:

- A focused strategy will yield a significant impact to deliver a future STEM workforce given the nation's rapidly changing demographics.
- Resources are constrained so we need to be really smart about how and when we are spending our efforts.
- In the current state, there are individual efforts within different parts of NASA that may not be aligned to an Agency strategy.
- As an example of the benefit of an integrated strategy, when the Office of Education served as the backbone for the Agency's internship program, they saw dramatically improved results in the numbers of applicants and the agency made it easier for applicants to navigate the process.

Recommendation 1 Cont'd

Short Title of Recommendation: Integrated Education Strategy

Consequences of No Action on the Recommendation:

- The Agency's STEM Education and Outreach messages and impact are diluted.
- Lack of a clear strategy could lead to duplicative efforts and/or sending mixed signals to the end-users.
- The agency is missing out on the creativity and innovation that can come from people working across sectors to solve the same problem.

Recommendation 2

Short Title of Recommendation: Elevating Ad-Hoc Task Force Status

Recommendation: The Ad-Hoc STEM Education Task Force should become a regular committee of the NAC.

Recommendation 2 Cont'd

Short Title of Recommendation: Elevating Ad-Hoc Task Force Status

Major Reasons for the Recommendation:

- A regular committee of the NAC that focuses on STEM Education, and is made up of representatives from key stakeholder groups, will provide a set of diverse perspectives about trends and current events in the national STEM movement.
- A regular committee of the NAC that focuses on STEM Education, and is made up of representatives from key stakeholder groups, will provide key insights into STEM education issues that affect different constituent groups.

Recommendation 2 Cont'd

Short Title of Recommendation: Elevating Ad-Hoc Task Force Status

Consequences of No Action on the Recommendation:

- The Terms of Reference for the Ad-Hoc STEM Education Task Force indicate that with no extension or formalization, the task force dissolves in November of 2018.
- The institutional knowledge developed by the current task force over the last 30 months will be lost.